

The Role of Crop Production Clubs in Technology Transfer*

ABSTRACT

This study was undertaken to determine if crop production club members represent an adopter category of the adoption diffusion theory as outlined by the literature, to obtain a more detailed description of the characteristics of the crop production club members and how they relate to the adopter categories and to determine the role crop production clubs play in the technology transfer process. A telephone survey was conducted using two groups, one selected from crop production clubs that had been organized for more than five years and the other a stratified random sample of non-club farmers in the surrounding area to the clubs. The questionnaire was designed to obtain information about innovative cropping practices, as well as demographic data, personal characteristics and communication behavior. A total of 38 crop production club members and 28 non-club farmers were contacted between April 22 and May 10, 1991.

The results of the study found that the characteristics exhibited by crop production club members were similar to those outlined in the adoption-diffusion theory for early adopters. Therefore crop production club members fit into the adoption-diffusion process as early adopters. Crop clubs use demonstrations as a way of introducing new innovations to their club members. Both groups indicated that they used neighbors often as a source of information and therefore, crop production clubs members likely transfer information to others through this and other channels. They transfer technology through the adoption-diffusion process as early adopters. From this study it can be concluded that crop production clubs do play a role in the technology transfer process.

* A paper prepared by Glen Hass and Donna Fleury
Extension Division, University of Saskatchewan and presented at the 1992 Soils
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Introduction

The introduction of innovative practices and the technology transfer process have been an integral part of the agriculture sector. Technology transfer continues to play an important role in agriculture. Traditionally, technology transfer was carried out by government departments, universities and research stations. Over the past number of years, these have been joined by a number of new sources. Crop production clubs are one of the newer sources emerging in the field. There is information available relating to technology transfer and sources of technology transfer. However, there is very little information available about crop production clubs because they are new.

There have been a few recent studies conducted to determine how clubs operate. Crop production clubs consist of a group of agriculture producers from a local area who form a group to share information and to use the opportunity to innovate and compare results. The producers use the information from their projects for their own benefit. However, their use of new approaches is easily observable by other producers in the area and they are willing to share their results and this may well be important in the adoption-diffusion and technology transfer process. A review of the literature outlines the adoption-diffusion process, including the adopter categories and adopter category characteristics. The literature also provides a background of technology transfer and where adoption-diffusion fits into the process.

An increase in the interest of crop production clubs has been accompanied by an increase in the number of clubs, the number of projects and the amount of funding. The the Saskatchewan producer club directory listed 28 organized crop clubs. With the increased focus on crop production clubs and the limited amount of information available, this study was conducted to determine the role crop production clubs play in the technology transfer process. It was designed to determine how crop production clubs fit into the adoption-diffusion process by identifying which adopter categories they represent and the corresponding characteristics they exhibit.

With the increasing emphasis on technology transfer and the increasing number of sources involved in the process, it is important to determine what role these various sources play. The information provided by this study adds to the limited body of knowledge about crop production clubs in relation to their role in the technology transfer process.

The focus of the study was only on crop production clubs and crop-related activities. In the literature on the adoption-diffusion process, five adopter categories (innovators, early adopters, early majority, late majority and laggards) and corresponding characteristics were outlined. (Rogers, 1983). Lionberger (1960) states however, that the division of adopters into three categories rather than five is sufficient to describe most known characteristic differences in relation to the adoption process. It was extremely difficult to distinguish between innovators and early adopters in this study. Therefore, for the purposes of this study, Lionberger's three adopter categories (early adopters, majority and late adopters) were used in the analysis and discussion.

The study made the assumption that there had been enough time for the adoption-diffusion process to take place with those clubs that have been organized for five years or longer. Also, based on other studies and the adoption-diffusion theory, it can be assumed that the presence of a crop production club would likely attract the more progressive farmer in the area to join the club.

Technology transfer has played an important role in agriculture. There has been some research conducted and an effort made to define and describe technology transfer as well as to outline the major sources. Fuller (1982), Baker (1987), Whale (1989), and a recent report called Growing Together (1990), have all contributed to the discussion.

The adoption-diffusion theory, which fits into the final phase of the technology transfer process, has also been the subject of research and discussion. The main contributors to adoption-diffusion research are Lionberger (1960), Rogers (1971, 1983), Fliegel (1984) and Roling (1988). As a result of these studies, adopter categories and characteristics have been established. Rogers has reviewed and analyzed the major studies of adoption-diffusion and established a refined and accepted version of five adopter categories and corresponding characteristics. However, as mentioned previously, Lionberger's generalization of five adopter categories into three adopter categories was used in the analysis and discussion. The crop production club members selected for this study likely represent the early adopter category of the adoption-diffusion process.

A study conducted by Hass (1989) has provided the majority of the background for crop production clubs, including their structure and function. Bjorge (1988) and Tanner (1987) have made presentations about crop clubs, which also provided some useful information. There have also been a number of studies conducted, including those by Blackburn, et. al. (1983), Whale, et. al. (1984) and Alberta Agriculture (1983), to determine how farmers value various information sources, including information on rating neighbors as a useful source of information.

This study was conducted through telephone interviews with the individuals in the selected sample. Telephone interviews were chosen in order to obtain the best possible response under the circumstances. On-farm interviews were rejected due to the time of the year, as well as the time and travel distances that would be required to obtain face-to-face on-farm interview information.

Research relating to the adoption-diffusion process has been studied for several years. Rogers, (1971, 1983) a prominent researcher in the diffusion field, has summarized the research results from major studies conducted in the field. Lambie (1984) summarizes the extent of Rogers work with a statement about his 1971 book (co-authored by Shoemaker), "their book is based on an extensive review of the research on diffusion and adoption of innovations from a broad range of fields. It is a very comprehensive and much referenced source."¹ Rogers has since published another book in 1983 which expands on much of the information in the 1971 publication. Roling (1988) similarly states that "Everett Rogers systematized and disseminated the generalizations of the hundreds of empirical diffusion studies with enthusiasm, clarity and care (1962, 1971 and 1983)"².

The North Central Regional Publication No. 13 (1962) states that the system of bringing new ideas from their initial development to acceptance by farmers is accomplished through two interrelated processes called diffusion and adoption. They describe the diffusion process as "the spread of new ideas from originating sources to the ultimate users. The

¹Rogers, Everett M. and Floyd F. Shoemaker (1971)
Communication of Innovations: A Cross-Cultural Approach pg. 33

²Rogers, Everett M. (1983)
Diffusion of Innovations pg. 65

adoption process is a mental process through which an individual passes from first hearing about a new ideas to its final adoption."³

Rogers (1983) identifies four main elements of diffusion of innovations in his definition, "diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system."⁴ "An innovation is an idea, practice or object that is perceived as new by an individual or other unit of adoption"⁵. He suggests that individuals perceive a number of characteristics of innovations which explains the different rate of adoption. Generally, receivers adopt some innovations more rapidly than other innovations. Innovations adopted more quickly are considered by receivers as having greater relative advantage, compatibility, trialability, observability and less complexity.

Rogers defines communication channels, the second element, as the way in which messages are transferred from one individual to another. He suggests that the results of various diffusion investigations show that most individuals depend on subjective evaluation of an innovation that is communicated to them through another individual like themselves who had previously adopted the innovation. The process, in its most elementary form, involves four elements: an innovation; individual or other unit of adoption that has knowledge of, or experience with using, the innovation; another individual or other unit that does not yet have knowledge of the innovation; and a communication channel connecting the two units.

The third element in the diffusion process is time. Rogers suggest that including time as a variable in the diffusion process is a strength, but the measurement of time can also be criticized. There are three ways time is involved in the innovation process, namely in the innovation-decision process, the innovativeness of an individual and the innovation's rate of adoption in a system. He outlines the five main steps in the innovation-decision process: knowledge, persuasion, decision, implementation and confirmation. "Innovativeness is the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than the other members of a system."⁶ Five adopter categories have been developed to classify members of a social system on the basis on innovativeness. The rate of adoption is the relative speed with which an innovation is adopted by members of a social system. The final element in Roger's definition of diffusion is the social system, which he defines a set of interrelated units (individuals, informal groups, organizations and or subsystems) that are engaged in joint problem solving to accomplish a common goal. Crop production clubs are a group of local producers who form a group for a specific purpose. They use demonstrations to try innovations that may provide useful information for members of the club. Although most of the activities are designed for club members only, other farmers in the area may benefit from the information by viewing the demonstrations and talking to neighbors who are members of the club.

Rogers (1983) points out that although there have been numerous titles of adopter categories developed, eventually one method of adopter categorization that he proposed in 1962 to be the standard, took over the dominant position. This provided for a

³North Central Regional Publication No. 13 (1962) pg. 3

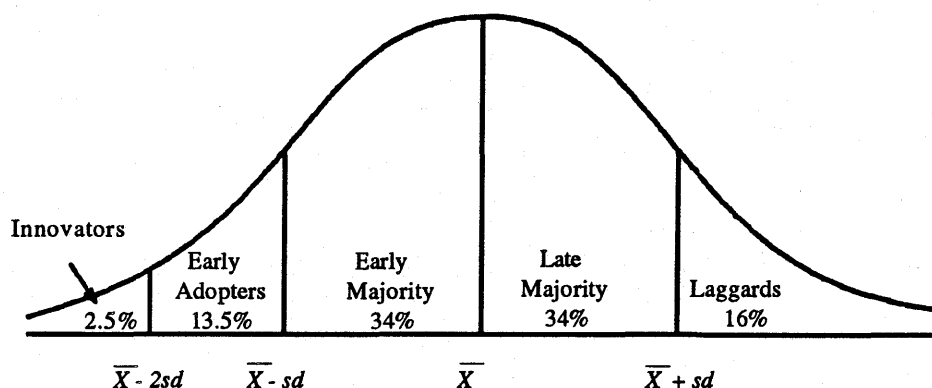
⁴Rogers, Everett M. (1983)
Diffusion of Innovations pg. 10

⁵Rogers, Everett M. (1983)
Diffusion of Innovations pg. 11

⁶Rogers, Everett M. (1983)
Diffusion of Innovations pg. 22

standardization of both the nomenclature and the classification system. Lionberger (1960), North Central Regional Extension Publication No. 13 (1961), Fliegel (1984), Lamble (1984) use Roger's categories in their discussions and Roling (1988) refers to his work. Rogers states that there is more known about innovativeness than about any other concept in diffusion research. The short-term goal of many change agencies is increased innovativeness of their clients and therefore, any diffusion research sponsored by these change agencies focuses on this main dependent variable of innovativeness. Innovativeness is one of the best single indicators of the success of development programs. This is another reason, particularly for developing countries, that the prime focus of diffusion research is innovativeness. The ultimate goal of most diffusion programs is behavioral change, indicated by innovativeness, rather than cognitive or attitudinal change. Innovativeness was the foundation of the design of this study and was used to determine how crop production clubs fit into the adoption-diffusion process. This information was also used to determine the role crop production clubs play in the technology transfer process.

Individuals in a social system adopt an innovation at different times. Rogers (1983), explains that five adopter categories were developed to classify adopters based on their innovativeness or when they first began using a new idea. The five categories describe "ideal" types which are based on generalizations of real cases and designed to allow for comparisons among groups of similar types. The five adopter categories are: innovators, early adopters, early majority, late majority and laggards. Innovators are the first 2.5 percent of the individuals to adopt an innovation. Early adopters are the next 13.5 percent to adopt a new idea. The early majority are the next 34 percent of adopters and the late majority form the next 34 percent of adopters. The last 16 percent are the laggards.



The innovativeness dimension, as measured by the time at which an individual adopts an innovation or innovations, is continuous. This variable, however, may be partitioned into five adopter categories by laying off standard deviations from the average time of adoption.

Figure 1.1 — Adopter categorization on the basis of innovativeness.
(Rogers, 1983, pg. 247)

Innovators represent the two or three percent of a normal distribution, are noted as being "venturesome" and are eager to try new ideas. These interests tend to lead innovator out of their local circle of peer networks into a more cosmopolite social relationship. Their communication patterns and friendships tend to be among a group of innovators and may be spread over great geographical distances. Because innovators are the first to try new innovations, they tend to have the financial ability and psychological ability to cope with the

high degree of uncertainty and risks associated with an innovation. The innovator plays the important role in the diffusion process of launching new ideas into a social system, although they may not be respected by other members of the social system.

Early adopters are the next 10 to 15 percent to adopt new ideas and are a more integrated part of the local social system than are innovators. They are "respected", have high social status and have the greatest degree of opinion leadership in most social systems. Early adopters serve as a role model for many other members of a social system and are considered to be "the individual to check with" before using a new idea. Peers of early adopters respect them as representing successful and discrete use of new ideas. Therefore, the role of early adopters is to decrease uncertainty about a new idea by adopting it and through interpersonal networks conveying a subjective evaluation of the innovation to near-peers.

Early majority represents the approximate third of the population who adopt new ideas just before the average member of a social system. They seldom hold leadership positions, but interact frequently with their peers. Early majority are considered to be deliberate because of their relatively long innovation-decision period. They provide interconnectedness in the system's networks and provide an important link in the diffusion process between the early adopters and the late majority.

The late major normally represent the third of the population who adopt new ideas just after the average member of a social system. They are described as skeptical and approach new innovations cautiously. They may adopt new practices because of economic necessity and increasing social pressures. Even though they can be persuaded of the utility of new ideas, peer pressure is still necessary to motivate adoption. Scarce resources means almost all of the uncertainty must be removed from the innovation before the late majority feel it is safe to adopt.

Laggards are the last 15 percent to adopt and are considered to be "traditional". The past is the point of reference for the laggard, with decisions made in terms of what has been done in previous generations. They are the most localite of all adopter categories and are often isolates in social networks. Laggards are often suspicious of innovations and change agents. Limited resources mean that laggards want to be relatively certain that a new idea will not fail before they can afford to adopt. When they do adopt an innovation, it may already have been superseded by another more recent idea that is already being used by innovators.

Although five adopter categories have been outlined by Rogers, Lionberger (1960) points out that a general division of adopters can be made into early, late and the intervening or majority. These three divisions are sufficient to describe most known characteristic differences in relation to position on the adoption continuum.

There has been a large amount of research literature accumulated about variables related to innovativeness. Rogers (1983) summarizes the diffusion research into a series of generalizations under the following headings: socioeconomic status, personality variables and communication behavior.

Fliegel (1984) and Lionberger (1960) state that early adopters tend to be younger. However, Rogers states that there is inconsistent evidence about the relationship of age and innovativeness. Earlier adopters have more years of education, have higher social status, upward social mobility and have larger-sized units than later adopters. They are more likely to have a commercial (rather than subsistence) economic orientation than later adopters.

Earlier adopters have a more favorable attitude toward change than later adopters. They are also more able to cope with uncertainty and risk. Thomas, 1987 found evidence in his study that farmers have some ability to assess their own risk attitudes. Earlier adopters also have a more favorable attitude to science and education. They have higher levels of achievement motivation and higher aspirations than later adopters.

Earlier adopters have more social participation than later adopters. They have a greater knowledge of innovations and seek information about innovations more actively than later adopters. They have a higher degree of opinion leadership and are more likely to belong to highly interconnected systems than are later adopters. Earlier adopters have more change agent contact, have greater exposure to mass media communication channels and interpersonal communication channels than later adopters.

Rogers (1983) outlines each of the three communication channels that adopters are likely to use for information. Mass media communication channels use mass medium, such as radio, television, newspapers and publications, to transmit messages from one source to a large audience. Mass media is used to create awareness-knowledge. Interpersonal communication channels involve face-to-face exchange between two or more individuals. This channel is an effective way of persuading an individual to adopt a new idea, particularly when the channel links individuals who are near-peers. Finally, Rogers outlines change agents as individuals, often professionals with university degrees in technical fields, who influence farmers innovation decisions in a direction deemed desirable by a change agency.

The generalizations indicate that an independent variable is positively related to innovativeness, which means that innovators will score higher on these variables than laggards. Therefore, from the diffusion research, a set of general characteristics of each adopter category have emerged. Rogers states that the important differences among these categories suggest that change agents should use somewhat different approaches with each adopter category. This means that one approach might appeal to innovators who adopted an innovation because it was soundly tested and developed by credible scientists. However, this approach would not likely be effective with the late majority and laggards who tend to have a less favorable attitude toward science. These later adopters will not adopt a new idea until most of the uncertainty about an innovation has been removed. They also place the greatest credibility in the subjective experience of their peers with the innovation conveyed to them through interpersonal channels.

The information provided by the literature review about the adoption-diffusion process has provided the background for this study and led to the design of the study. The study used innovativeness, as discussed by Rogers important as a source of farm information. Alberta Agriculture (1983) found similar results, with 75% of farmers surveyed felt neighbors were a very or moderately important source of farm information. Whale, Hass and Hobin (1984) found that 85% of farmers surveys felt that neighbors or family members were important sources of information about new farming practices. This study states that neighbors were consulted about a new idea that they had tried or were using to see how it had worked out under practical conditions similar to the farmer's own, and to consider implementation and management questions. The study draws the general conclusion "that decision making regarding change in farm practice is a complex process dominated by personal contacts. It requires information about the economic benefits of the change, and

information that allows the farmer to translate the change in relation to his or her own abilities and resources."⁷

This study consisted of two groups of farmers from Saskatchewan and Manitoba, one group made up of crop production club members and the other made up of farmers who were not club members, but who farm in the same areas. The crop production club sample was derived from the Saskatchewan Producer Club Directory 1990 and the Manitoba Department of Agriculture, Dauphin region. Only clubs that had been organized for five years or longer were included in the selection process because it was felt that clubs operating for less than five years would not have had enough time to have much effect in the technology transfer process. Six clubs in Saskatchewan and one club in Manitoba, met the requirement of being organized for five years or longer. A letter was sent to the contact person for each club outlining the study and requesting a copy of the club membership mailing list. Once the club membership list was received, letters outlining the study and the procedure were mailed to each individual member of the selected clubs.

The non-club farmer sample was a stratified random sample which was selected from areas within reasonable proximity to a crop production club and had likely had the opportunity to observe practices club members were trying. The stratified random sample was derived by using telephone directories for the selected areas. This sampling procedure was used for all areas except for one club area which included two telephone exchanges. In this case, a copy of the Rural Municipality Map was obtained and a stratified random sample was selected from the farmers listed on the map. A letter outlining the study and the procedure were mailed to each selected farmer.

A telephone interview was conducted with the selected sample between April 22 and May 10, 1991. Telephone interviews were selected over on-farm interviews for various reasons, including the time of year (spring), the required amount of time and the required travel distances to complete the study.

Summary of Findings

A profile of the crop production club members was established based on the characteristics outlined in the questionnaire. The characteristics of crop production club members are representative of those outlined in the adoption-diffusion theory for early adopters. Crop production club members are younger, better educated, operate larger-sized units and average higher annual gross sales than the non-club farmers sample. (Table 1) Crop production club members have a more favorable attitude to change, are more able to cope with risk and uncertainty and have a more favorable attitude to research. (Table 2)

Crop production club members use change agent services, such as extension programs, agrologist, specialists, Agriculture Canada Research Stations and university faculty more than non-club farmers. Other sources of cropping information were generalized into two additional categories as outlined by the theory, mass media and interpersonal channels. However, the categories seem to be too general to make any conclusive statements. Crop production club members use magazines, government publications and television more than non-club farmers, while non-club farmers use newspapers and radio more often as sources of cropping information. Crop production club members use agriculture organizations to a greater extent than non-club farmers, but non-club farmers use service agents, banks and credit agencies, industry representatives and agriculture consultants more than crop

⁷Rogers, Everett M. (1983)
Diffusion of Innovations pg. 18

production club members. Both groups indicated they used neighbors often as sources of cropping information. (Tables 4, 5, 6)

Both crop production club members and non-club farmers were of the opinion that the crop production club had influenced cropping practices on their farm and in their area. However, crop production club members felt that the clubs had more influence than the non-club farmers, with over 90% of crop production club members are compared to only 50% of non-club farmers indicating they felt the club had influenced cropping practices. (Table 7)

Conclusions

Crop production club members exhibit characteristics similar to those outlined in the adoption-diffusion theory for early adopters. Therefore crop production clubs members fit into the adoption-diffusion process as early adopters. The theory states that the role of early adopters is to decrease the uncertainty about a new idea by adopting it and through interpersonal networks convey a subjective evaluation of the innovation to near peers. Both groups indicated that they used neighbors often as a source of information and therefore, crop production club members likely transfer information to others through this and other channels. In this study, both groups indicated they use neighbors often or occasionally as a source of information 89% of the time. Other related studies reviewed in the literature indicate 75% to 85% use neighbors often or occasionally as a source of information. Crop production club members indicated that they have a high level of interaction with extension and agriculture organizations. Therefore, they are a good group to target for extension programs and as early adopters, will transfer the information through the adoption-diffusion.

The literature outlines several stages in the adoption-diffusion process. The final two stages are the transfer stage or the stage where innovations are introduced to the target population and the adoption-diffusion stage where farmers decide whether or not to adopt a new innovation. The adoption of the new innovation usually spreads through the target population through the various categories outlined by the theory: early adopters, majority and laggards.

The literature suggest that it is important for farmers and producer groups to participate in the technology transfer process, particularly through various ways such as providing advice and supporting activities such as on-farm demonstrations. The literature also states that demonstrations are an effective and efficient means of accelerating technology transfer from the research lab to the farm. Crop clubs use demonstrations as a way of introducing new innovations to their club members. They transfer technology through the adoption-diffusion process as early adopters. They are key contacts with extension and agriculture organizations. Therefore, crop production clubs do play a role in the technology transfer process through the adoption diffusion process.

Table 1 – DEMOGRAPHIC INFORMATION

	*CPC	*NON	STATS CAN (1986)
AGE (Average)	30-39 yrs.	40-49 yrs.	40+ yrs.
POST SECONDARY EDUCATION	76%	25%	25%
GROSS SALES OVER \$100,000	74%	39%	16%
ACRES FARMED OVER 2,000	40%	14%	11%

*** CPC (Crop Production Club)**

*** NON (Non Club Members)**

Table 2 – PERSONALITY VARIABLES/ATTITUDES

VARIABLE/ATTITUDE	CPC	NON
FARM SIZE TO INCREASE	84%	83%
TREND IS OK	60%	61%
SHOULD HAVE OPEN MARKETING	60%	61%
PREPARED TO RISK		
HIGH	19%	4%
MED	67%	75%
LOW	14%	21%

Table 3 – PRIORITIES FOR FUNDING

RANKING	CPC	NON
1	research	subsidies
2	subsidies	research
3	extension	training
4	training	extension

Table 4 – MEDIA SOURCES FOR CROPPING INFORMATION (%)

	*Often		*Occasionally		*Rarely		*Never	
SOURCE								
	CPC	NON	CPC	NON	CPC	NON	CPC	NON
Newspapers	65	82	19	7	16	11	0	0
Farm Magazines	46	32	32	32	22	36	0	0
Specific Publications	37	18	39	36	24	39	0	7
Radio	13	18	42	39	42	39	3	4
TV	13	21	42	29	37	43	8	7

* Indicated by percent (%)

Table 5 – SOURCES OF CROPPING INFORMATION (%)

SOURCE	Often		Occasionally		Rarely		Never	
	CPC	NON	CPC	NON	CPC	NON	CPC	NON
Extension Programs	37	4	39	61	24	14	0	21
Extension Agrologists	31	18	45	50	24	18	0	14
Extension Specialists	29	21	42	29	21	36	8	14
AG CAN	5	7	32	21	37	36	26	36
U of S Faculty	3	0	32	7	32	36	33	57
Farm Service Centers	42	64	32	20	21	8	5	8
Financial Institutions	5	4	19	25	21	28	55	43
Industry	26	29	45	50	24	14	5	7
Private Consultants	0	0	13	18	24	25	63	57
AG Organizations	13	4	53	32	26	32	8	32
Neighbors	34	57	55	32	11	7	0	4

Table 6 – NUMBER OF INNOVATIVE CROPPING PRACTICES ADOPTED IN PAST FIVE YEARS
(%)

NUMBER	CPC	NON
<3	34	82
3-5	53	18
>5	13	0

Table 7 – IMPORTANCE OF CROP CLUB FOR AREA (5%)

	<u>CPC</u>	<u>NON</u>
Very Important	5	0
Moderately	49	25
Slightly	41	25
Not At All	5	50

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